feeling of shipowners on the subject of establishing such a central authority. If it should be formed, then the load-line question might be dealt with more satisfactorily than it has been hitherto, and one difficulty in dead-weight measurement would disappear. But others, and probably fatal ones, would remain; more particularly in dealing with passenger steamers or vessels built to carry light cargoes. In such cases Mr. Waymouth proposes to fix, for tonnage purposes only, a deep load-line; this is not merely objectionable, but would probably be impracticable in many vessels. The dead-weight system has much to recommend it for consideration on the grounds of simplicity and exactness, as well as freedom from the difficulties incidental to internal measurement. But it is not likely to come into use.

Mr. Waymouth, it will be noted, agrees with the majority in proposing to continue the immemorial practice of basing tonnage measurement upon earnings or earning-power. This principle, although long accepted, has always been held open to question, on the ground that the accommodation provided for a ship in harbours, docks, canals, &c., should regulate the dues paid by her, and not her earnings. The "service rendered," and not the earnings, does appear the fairest basis of assessment, and has a considerable weight of authority to support it; but to adopt this basis would clearly necessitate a settlement of the mode of appraising service rendered. Mr. Rothery proposes to take the displacement, or volume of water displaced by a ship to a fixed load-line, as the measure of this service. The load-line, he suggests, might be fixed by the owner or some central authority. To this proposal many objections have been raised; but that which seems to have most force is found in the statement that the volume of water displaced does not measure the accommodation required, since various degrees of fineness of form under water might be associated with the same extreme dimensions—length, breadth, and draught. Two ships agreeing in these dimensions and requiring practically the same accommodation might differ in displacement by as much as 50 to 60 per cent. of the smaller.

Mr. Rothery's proposal has, however, done good in recalling attention to the principle of taxation on *service rendered*. In further investigations this is not likely to be overlooked; and it must be possible to frame some scheme which is not open to the objection to displacement above mentioned. The proposal to take the product of the three extreme dimensions of a ship as a basis for tonnage has been considered, and has much to recommend it, if associated with a fixed load-line. It cannot be said that any of these alternative schemes have received the full consideration they require before being brought forward for adoption. The investigation would necessarily be laborious, and the issues dependent upon it are so important that it should be intrusted only to competent and impartial hands. Certain conclusions are necessarily forced upon every person who makes a study of this subject. First, it is impossible in any revision of tonnage law to ignore the question of the load-line legislation. The majority of the Commission, in their final Report, propose to keep the two questions distinct; but it has been stated publicly by Mr. Waymouth that up to the very last draft Report, the majority made recommendations in the opposite direction; and if this is the case the less weight attaches to the recommendation which actually appears. Second: in considering future legislation, both for tonnage and for load-line, greater regard must be had to the provision of stability for merchant ships than has been had heretofore. Rough "rules of thumb" for free-board, in relation to depth of hold, are out of date. Third: the work to be done must be largely dependent upon the calculations made by competent naval architects for various types of ships, and various conditions of loading. Such calculations applied to vessels which have been thoroughly tested at sea under known conditions of lading must be the foundation for future rules for load-lines. Lastly, it is much to be desired that the proposed Shipping Council should be constituted, and that it should be a central body, including all classes interested in shipping, and having behind it a staff of skilled naval architects. The Marine Department of the Board of Trade has been much abused, and probably unfairly criticised in many cases. Its action, both as regards tonnage legislation and the load-line of ships, may not have been all that could be desired, yet it must be admitted to have been well intentioned. But it cannot be supposed that the Department as now constituted is capable of dealing with the questions pressing for solution. Neither its nautical, technical, nor adminstrative staff is competent for this task. And it may be supposed that the necessary reinforcement of that staff, the valuable assistance and advice of a Council of Shipping, and the more scientific investigation of matters relating to the safety and good behaviour of merchant ships by naval architects, will be welcomed by the Board of Trade as warmly as by the shipping community. Until these further investigations are completed, amended legislation scarcely seems practicable. It is clearly impossible on the lines laid down in the Report of the majority of the Royal Commission of 1881. W. H. WHITE

MYTH AND SCIENCE

Myth and Science. An Essay. By Tito Vignoli. International Science Series. (London: Kegan Paul, Trench, and Co., 1882.)

THIS work is devoted to a theory of myths and myth-formation, which is to some extent novel. Looking to the general, if not universal, tendency of all races of mankind to create myths, the author contends that the propensity must point to some feature of human psychology of more than a merely superficial character, and without disputing previous theories as to the origin and growth of myths, he seeks to explain the *raison d'être* of the myth-forming faculty. Thus, for instance, he says:—

"The worship of the dead is undoubtedly one of the most abundant sources of myth, and Spencer, with his profound knowledge and keen discernment, was able to discuss the hypothesis as it deserves. . . . Yet even if the truth of his doctrine should be in great measure proved, the question must still be asked how it happens that man vivifies and personifies his own image in duplicate, or else the apparitions of dreams or their reflections, and the echoes of nature, and ultimately the spirits of the dead."

And, speaking of Tylor, he adds:—

"He admits that there are in mankind various normal

and abnormal sources of myth, but he comes to the ultimate conclusion that they all depend on man's peculiar and spontaneous tendency to *animate* all things, whence his general principle has taken the name of *animism*. . . . . But, while assenting to this general principle, which remains as the sole ultimate source of all mythical representation, I repeat the usual inquiry; what causes man to animate all the objects which surrounds him, and what is the cause of this established and universal fact?"

And elsewhere the author states this problem thus :—

"To attain our object, it is necessary that the direct personification of natural phenomena, as well as the indirect personification of metaphor; the infusion of life into man's own shadow, into reflex images and dreams; the belief in the reality of normal illusions, as well as of the abnormal hallucinations of delirium, of madness, and of all forms of nervous affections; all these things must be resolved into a single generating act which explains and includes them."

Such being the problem with which the work is mainly concerned, its solution is attempted by the following theory :—Assuming the fundamental identity of human and brute psychology, it is argued *a priori* that, seeing the tendency to personify inanimate objects is so universal among primitive men, we might expect to find a similar tendency in animals, and this, according to the author, we do find :—

"Animals are accustomed to show such indifference towards numerous objects, that it might be supposed that they have an accurate conception of what is inanimate; but this arises from habit, from long experience, and partly also from the hereditary disposition of the organism towards this habit. But if the object should act in any unusual way, then the animating process which, as we have just said, was rendered static by its habitual exercise, again becomes dynamic, and the special and permanent character of the act is at once revealed."

And he proceeds to describe many experiments of his own, in frightening or surprising animals by making inanimate objects perform unusual movements. From these considerations and experiments he concludes that every object of perception is "implicity assumed" by an animal to be "a living, conscious, and acting subject;" that the animal transfuses into all things, "in proportion to the effects which result from them, his own nature, and modifies them in accordance with intrinsic form of his consciousness, his emotions, and his instincts."

This being taken as true of animals, the theory proceeds to the consideration that if we superimpose on the animal faculties of sensation and perception, the distinctively human faculties of reflection and symbolic thought, we should obtain a full explanation of the psychology of myth-formation.

We have said that this theory is to some extent novel, and it will now be seen that the extent to which it is so consists in its relegating to the domain of animal psychology that tendency to animism which has already been recognised as the feature in human psychology which is largely concerned in the formation of myth. But even thus far the theory is not wholly novel, for Comte supposed that animals possessed some crude ideas of fetishism, and Spencer, in his "Principles of Sociology," says :—

"Holding, as I have given reasons for doing, that fetishism is not original but derived, I cannot, of course, coincide in this view; nevertheless I think the behaviour of intelligent animals elucidates the genesis of it;"

And he proceeds to detail cases which he has himself observed of "the idea of voluntary action being made nascent" in animals upon their seeing or feeling inanimate objects moving in unaccustomed ways. This, we think, is the whole extent to which the observed facts of animal intelligence entitle us to go. Uniformity of experience generates in animals, as in young children, organised knowledge of animate and inanimate objects, so that they are always more or less prepared with some antecedent expectation of the manner in which this or that object will behave. When, therefore, an inanimate object begins to move in some unaccustomed manner, the animal becomes alarmed, and no donbt "the idea of voluntary action becomes nascent."[1] But to argue from this fact that "every object, every phenomenon is for him a deliberating power, a living subject, in which consciousness and will act as they do in himself," and consequently that to animals the whole world "appears to be a vast and confused dramatic company, in which the subjects, with or without organic form, are always active, working in and through themselves, with benign or malignant, pleasing or hurtful influence"—to argue thus is surely to go far beyond anything that the facts either warrant or suggest. The very consideration that an animal shows alarm and horror when an inanimate object begins to behave like an animate one, points to the conclusion that he has made a pretty definite mental classification of objects as animate or inanimate. Therefore, without going further into the matter, it seems to us that the attempt made by this writer to argue for an universal animism as a feature of brute psychology, is a failure.

Of more interest and sounder theory is the part of his work which treats of the connection between Myth and Science. He says :—

Man, by means of his reduplicative faculty, retains a mental image of the personified subject, which is only transitory in the case of animals, and it thus becomes an inward fetish, by the same law, and consisting of the same elements, as that which is only extrinsic. These phantasms are, moreover, personified by the classifying process of types, they are transformed into human images, and arranged in hierarchy, and to this the various religions and mythologies of the world owe their origin. Since such a process is also the condition and form of knowledge, the source of myth and science is fundamentally the same, for they are generated by the same psychical fact"—*i.e.* that of ideally classifying objects of perception—"the historical source of the two great streams of the intellect, the mythical and the scientific, is found in the primitive act of *entifying* the phenomena presented to the senses"—in the one case with the conception of personality, and in the other with that of natural order.

This idea of myth and science having a common root in the rational faculty of man is not, of course, a profound one, seeing it is obvious that myth, like science, arises from the need or desire of reason to *explain* the facts of nature which are everywhere obtruded upon the observation of "the thinking animal"; but it is perhaps well that this truth should be clearly stated, as it is in the work before us. We think, however, that here, as indeed throughout, the work is needlessly protracted.

GEORGE J. ROMANES

[1] See NATURE, vol. xvii. p. 168 *et seq.*, where this subject is treated at more length.